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EXAMINER	
GUILL, RUSSELL L	
ART UNIT	PAPER NUMBER
2123	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/540,427	CHANG ET AL.	
	Examiner	Art Unit	
	RUSSELL GUILL	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 28 January 2008.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 23 June 2005 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to an Amendment filed January 28, 2008. Claims 1 – 22 have been examined. Claims 1 – 22 have been rejected.

2. **The Examiner would like to thank the Applicant for the very well presented response. The Examiner appreciates the effort to carefully analyze the Office action, and make appropriate amendments and arguments.**

Response to Remarks

3. Regarding amendments to the specification:

   a. The amendments to the specification are objected to for introducing new matter. Please refer to the Specification section below.

4. Regarding claims 10, 20 and 22 objected to for minor informalities:

   a. Applicant's amendments overcome the objections.

5. Regarding claims 8 – 14, 17 – 21 and 22 rejected under 35 USC § 112, second paragraph:

   a. Applicant's amendments to the claim overcome all but one rejection. Claim 17 was not completely amended, but the rejection has been changed to an objection below.

6. Regarding claims 1 and 17 rejected under 35 USC § 103:

   a. Applicant's arguments have been fully considered, but are not persuasive, as follows.

   b. The Applicant argues:

c. Applicants respectfully assert that the Examiner has failed to establish a prima facie case of obviousness in regards to independent Claims 1, 15-17, and 22 because one skilled in the art would not be motivated or have any suggestion to combine the references.

i. The Examiner respectfully replies:

ii. Motivation to combine is recited in the rejections.

d. The Applicant argues:

e. More importantly, even if the references are combined, the combination of references does not produce each and every limitation of independent Claims 1, 15-17, and 22. Independent Claims 1, 15, and 16 recite a method for virtual prototyping of plastic containers or preforms comprising a step of "providing heating information and calculating temperatures of primary and secondary heating sources...". Similarly, Independent Claims 17 and 22 recite an apparatus for virtual prototyping of plastic containers including a "means for generating primary and secondary temperature heating sources for providing energy to said preform..." and "a preform module for: ... (a) solving energy equations based on inputs from... said temperature heating sources...". Indeed, none of the cited references require a primary heating source and a secondary heating source in the virtual prototyping of a plastic preform or container. As a result, no combination of references can properly serve as a basis for rejection of independent Claims 1, 15-17, and 22, nor any claim dependent therefrom, under 35 U.S.C. 103(a).

i. The Examiner respectfully replies:

ii. Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

f. The Applicant argues:

g. Claims 1 and 17 apparatus, respectively, for the virtual prototyping of containers and recite a method and performs. In performance of the virtual prototyping method of Claim 1, and in using the virtual prototyping apparatus of Claim 17, a preform and oven geometry are inputted into a design program along with the heating and temperature information of the primary and secondary heat sources [Claims 1 and 17]. The application defines the primary and secondary heating sources as "lamp wattage, lamp power settings, overall power, reflection coefficients, initial preform temperature, and ceramic coating" [para. 0022]. Furthermore, another factor accounted for is the "effect of cooling convective air current on an outer surface of the preform as well as a relatively insulated inner surface of the preform" [para. 0033]. Energy equations are then solved and a cross sectional thermal profile of a final heated preform are computer. To determine the cross sectional profile, the preform geometry is discretized (or digitized) into a plurality of small rectangular blocks, and an amount of energy from the primary and secondary heating sources absorbed into each discretized block is used in calculating the energy incident and absorbed in an adjacent discretized block [para. 0026]. The radiation absorbed by each respective discretized block is incident to the exposure or viewing angle of each lamp as each respective discretized block travels through the oven [para. 0026; Fig. 5]. In other words, the energy absorbed by any discretized block depends directly on the location of and energy absorbed by an adjacent discretized block relative to the location and temperature of the primary and secondary heat sources.

i. The Examiner respectfully replies:

ii. The paragraph appears to be a summary review of the invention rather than an argument. The Examiner thanks the Applicant for the review because it is useful to understand the invention.

h. The Applicant argues:

i. Reeve discloses an experimental temperature model of a parison extrusion blow molded into a cylindrical furnace in the manufacture of polymer optical fiber (POP) [Abstract]. Reeve does not disclose, however, a method

for virtual prototyping that includes heating information and calculating temperatures of primary and secondary heating sources. In fact, Reeve discloses that the numerical model underpredicted the transient heating at certain locations of the parison [para. 4, pg. 294]. The discrepancies are attributed to "additional heating from insulation and futures… which were not modeled". **In** other words, secondary heating sources were not considered in the experiment of Reeve [para. 4, pg. 294]. The Examiner even notes this, stating "Reeve does not specifically teach: calculating temperatures of primary and secondary heating sources". The Examiner asserts that Turner cures the defect of Reeve. The Examiner states "Turner appears to teach: calculating temperatures of primary and secondary heating sources [pg. 11, right-side column, starting at the second paragraph] that starts with, "A filament has a radiative power…"; and pages 2-3, section labeled "Scope of the President Study")." However, Turner does not disclose primary and secondary heating sources. Indeed, Turner discloses that the system includes a quartz lamp or a plurality of quartz lamps [top of pg. 3, left column], but that in simulating the heat produced by the quartz lamps, secondary heating sources are neglected. The secondary heating sources neglected by Turner include the gaseous environment surrounding and with the quartz envelope, and higher order effects such as scattering and birefringence, polarization induced by any process associated with the quartz [top of pg. 3, left column, first full paragraph]. Furthermore, Turner discloses that "a coarse approximation of the entire system is required in order to assign a radiative power (and temperature)" to the heat sources, and that "complicated systems require more refined preliminary simulations in order to converge upon these input parameters" [Pg. 11, right column, first full paragraph). A thorough examination of Turner shows that it is completely devoid of any disclosure regarding simulation of primary and secondary heat sources in the virtual prototyping of containers or performs. Therefore, since Turner discloses that secondary heat sources are neglected and that an approximation of the entire system is used, Turner teaches away from the present invention.

i. The Examiner respectfully replies:

ii. While the Examiner appreciates the Applicant's arguments, the Examiner respectfully disagrees, as follows. The Applicant asserts, "A thorough examination of Turner shows that it is completely devoid of

any disclosure regarding simulation of primary and secondary heat sources in the virtual prototyping of containers or performs ", and the Applicant's argument appears to rest on this assertion. In the specification as published in Patent Application Publication 2006/0074614, at paragraph [0022], the specification recites, "Secondary sources of radiation like the temperatures of a backplate and reflectors within the oven are calculated . . .". Next, Turner recites at page 3, left-side column, second paragraph, "Metallic reflector surfaces are assumed to reflect radiant energy via additive specular and diffuse components", which would reasonably suggest to the ordinary artisan that secondary heat sources are simulated. And on page 2, last paragraph, Turner recites, "The systems discussed in this study include . . . a single lamp with a flat reflector, a single lamp with a parabolic reflector . . .", which further supports secondary heating sources using reflectors. Regarding primary heat sources, on page 11, right-side column, Turner discusses filament source temperatures, which would reasonably suggest primary heat sources to the ordinary artisan, in view of the common knowledge in the art presented in the references. In Turner, there are further discussions throughout the reference regarding filament and reflector heat sources. Thus, the Applicant's argument is not persuasive.

j. The Applicant Argues:

k. Furthermore, Reeve discloses an experimental temperature model of a parison extrusion blow molded into a cylindrical furnace in the manufacture of polymer optical fiber (POF) using the SIMPLER finite difference algorithm, while Turner discloses the model of a system includes a quartz lamp or a plurality of quartz lamps using the Monte Carlo method. Turner is devoid of any mention of the SIMPLER method, the modeling of

parisons, polymer optical fiber, and the like. Accordingly, one skilled in the art would have no motivation to combine the Reeve and Turner references.

i. The Examiner respectfully replies:

ii. The motivation to combine the art of Turner with the art of Reeve is described in the rejection of claim 1 below.

l. The Applicant argues:

m. Accordingly, even if the Reeve and Turner references are combined, the combination does not produce every limitation of independent Claims 1 and 17, which recite a "calculating temperatures of primary and secondary heating sources". As discussed above, Reeve is devoid of any mention secondary heating sources, while Turner expressly neglects secondary heating sources and provides a "coarse approximation" of the entire system. Therefore, one skilled in the art would have no motivation to combine the Reeve and Turner references, and even if the references were combined, the combination of references fails to teach or suggest each and every limitation of independent Claims 1 and 17. As a result, this combination of references cannot properly serve as a basis for rejection of independent Claims 1 and 17 under 35 U.S.C. § 103(a), and Claims 1 and 17 are allowable.

i. The Examiner respectfully replies:

ii. Both the motivation to combine the art and secondary heating sources were discussed above.

n. The Applicant argues:

o. The Examiner has failed to establish a prima facie case for Claims 2-7, depending from independent Claim 1, and Claims 18-21, depending from independent Claim 17, under 35 U.S.C. § 103(a) as being unpatentably obvious over Reeve in further view of Turner. Because Claims 2-7 and 18-21 contain at least the same limitations as Claims 1 and 17, respectively, as discussed above, Claims 2-7 and 18-21 are also allowable.

i. The Examiner respectfully replies:

ii. Applicant's arguments above were not persuasive, and thus the rejections of the claims are maintained.

p. The Applicant argues:

q. The Examiner has failed to establish a prima facie case for independent Claims 15 and 16 under 35 U.S.C. § 103(a) as being unpatentably obvious over Reeve in view of Turner in further view of McEvoy. Claims 15 and 16, like independent Claims 1 and 17, recite calculations of temperatures of primary and secondary heating sources and solving energy equations using the temperatures. Like Reeve and Turner, McEvoy does not teach the calculation of temperatures of primary and secondary heating sources and therefore does not cure the defects of Reeve and Turner. The Examiner relied on the McEvoy reference to cure a defect related to providing a stress/strain behavior of the material of a preform; however, a thorough examination of McEvoy shows that it is completely devoid of any disclosure regarding simulation of primary and secondary heat sources in the virtual prototyping of containers or performs. Therefore as discussed above, there is no motivation to combine the references, and even if the references are combined, the combination does not produce the limitation of performing calculations of temperatures of primary and secondary heating sources in virtual prototyping of containers and performs. As a result, this combination of references cannot properly serve as a basis for rejection of independent Claims 15 and 16 under 35 U.S.C. § 103(a), and Claims 15 and 16 are allowable.

i. The Examiner respectfully replies:

ii. As explained above, Turner appears to teach primary and secondary heating sources. Thus, the rejections of the claims are maintained.

r. The Applicant argues:

s. The Examiner has failed to establish a prima facie case for independent Claim 22 under 35 U.S.C. § 103(a) as being unpatentably obvious over Reeve in view of Turner in further view of McEvoy. Claim 22, like independent Claims 1 and 15-17, recites calculations of temperatures of primary and secondary heating sources and

solving energy equations using the temperatures. For the reasons discussed above for Claims 15 and 16, one skilled in the art would have no motivation to combine the references, and even if the references were combined, the combination does not produce the limitation of performing calculations of temperatures of primary and secondary heating sources in virtual prototyping of containers and performs. As a result, this combination of references cannot properly serve as a basis for rejection of independent Claim 22 under 35 U.S.C. § 103(a), and Claim 22 is allowable.

i. The Examiner respectfully replies:

ii. As explained above, Turner appears to teach primary and secondary heating sources. Further, as explained above, the motivation to combine the art of Turner with the art of Reeve is described in the rejection of claim 1 below. Thus, the rejections of the claims are maintained.

Specification

7. The amendment filed January 28, 2008, is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the amendment to page 6, lines 8 – 17 does not appear to be supported by the original specification.

8. Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Objections

9. Claim 17 is objected to for the following informality: the claim recites in line 7, "means for generating primary and secondary temperature of heating sources". The

Examiner respectfully requests that the Applicant compare the phrase with the corresponding limitation of claim 1 to determine if the phrase should be, "means for generating temperatures of primary and secondary heating sources".

10. Claim 17 is objected to for the following minor informalities: the claim recites in line 11, "temperature heating sources". The phrase appears to mean, "temperatures of heating sources".

11. Claim 22 is objected to for the following informality: the claim recites in line 8, "means for generating primary and secondary temperature of heating sources". The Examiner respectfully requests that the Applicant compare the phrase with the corresponding limitation of claim 1 to determine if the phrase should be, "means for generating temperatures of primary and secondary heating sources".

12. Claim 22 is objected to for the following minor informalities: the claim recites in line12 – 13, "said temperature of said primary and secondary heating sources". The phrase appears to mean, "said temperatures of said primary and secondary heating sources".

Claim Rejections - 35 USC § 112

13. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

a. **Claims 10 - 11** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

i. Regarding claim 10, the claim recites, "said radiation absorption spectra of said primary heating sources". The specification does not appear to describe radiation absorption spectra of primary heating sources.

ii. Regarding claim 11, the claim does not appear to be described in the specification.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. **Claims 1, 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve (Hayden M. Reeve et al., "Experimental and Numerical Investigation of Polymer Preform Heating", April 2001, Journal of Materials Processing & Manufacturing Science, Volume 9, pages 285 – 301) in view of Turner (Travis L. Turner et al., "Numerical and Experimental Analyses of the Radiant Heat Flux Produced by Quartz Heating Systems", March 1994, NASA Technical Paper 3387, pages 1 - 37).

a. The art of Reeve is directed to experimental and numerical investigation of polymer preform heating (*title*).

b. The art of Turner is directed to analyses of radiant heat flux produced by quartz heating systems (*title*).

c. The art of Turner and the art of Reeve are analogous art because they both pertain to the art of thermal radiation heat transfer. Further, the ordinary artisan would have known that quartz heaters were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

d. The motivation to use the art of Turner with the art of Reeve would have been the benefit recited in Turner that a method is developed for predicting the radiant heat flux distribution produced by quartz envelope heating systems (*page 1, section "Summary", first paragraph*), which would have been recognized as a benefit by the ordinary artisan because the ordinary artisan would have known that quartz heating systems were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

e. Regarding **claims 1, 17**:

f. Reeve appears to teach:

g. A method for simulating the heating of a plastic preform (*page 285, title, and abstract*).

h. inputting a preform geometry into a preform design program (*page 289, section labeled "Model", first paragraph, "The numerical domain is*

comprised of the furnace cavity and the polymer preform", and page 288, figure 2);

i. providing oven geometry and calculating spatial location of said preform through at least one oven (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2; it would have been obvious to calculate the spatial location of a preform through an oven, for example, see U.S. patent 4,407,651, column 1, lines 15 - 18, and U.S. patent 5,607,706, column 6, lines 8 - 15, both patents disclose a preform moving through an oven*);

j. providing heating information (*page 289, section labeled "Model", third paragraph, "The furnace wall temperature profile and iris temperatures were prescribed . . ."*) ~~and calculating temperatures of primary and secondary heating sources~~;

k. solving energy equations based upon said preform geometry, said spatial location of said preform, said temperatures, cooling air and radiation absorption spectra of a material of said preform (*pages 290 - 291, section labeled "Governing Equations", especially equation 4, the energy equation;and page 289, section labeled "Model"*); and

l. computing at least one cross sectional thermal profile of a final heated preform (*page 293, figure 4, section (c), please note the temperature profile of the preform; and pages 293 - 294, section labeled "Predicted Heat and Flow Patterns"*).

m. Reeve does not specifically teach:

n. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources;

o. Turner appears to teach:

p. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources (*page 11, right-side column, starting at the second paragraph that starts with, "A filament has a radiative power . . ."; and pages 2 - 3, section labeled "Scope of the Present Study"*);

q. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner with the art of Reeve to produce the claimed invention.

17. **Claims 2 - 7, 12 - 14 and 18 - 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve as modified by Turner as applied to claims 1 and 17 above, further in view of McEvoy (J.P. McEvoy et al., "Simulation of the Stretch Blow Molding Process of PET Bottles", 1998, Advances in Polymer Technology, volume 17, number 4, pages 339 - 352).

a. Reeve as modified by Turner teaches a method for simulating the heating of a plastic perform as recited in claims 1 and 17 above.

b. The art of McEvoy is directed to simulation of the blow molding process of PET bottles (*page 339, title*).

c. The art of McEvoy and the art of Reeve as modified by Turner are analogous art because they both pertain to the art of preform heating (*McEvoy, page 340, figures 1 and 2, and left-side column, second paragraph, and right-side column, first paragraph*).

d. The motivation to use the art of McEvoy with the art of Reeve as modified by Turner would have been the benefit recited in McEvoy that a simulation was successfully carried out to evaluate the optimum process conditions for a given preform and bottle (*page 351, section labeled "Conclusions", last sentence*), which would have been recognized as a benefit by the ordinary artisan.

e. Regarding **claim 2**:

f. Reeve does not specifically teach:

g. `providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform;`

h. McEvoy appears to teach:

i. providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform (*page 343 - 344, section labeled "Material Model", it would have been obvious that an elastic model included stress/strain behavior; and page 339, title*);

j. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

k. Regarding **claim 3**:

l. Reeve does not specifically teach:

m. generating a bottle geometry for a bottle design;

n. McEvoy appears to teach:

o. generating a bottle geometry for a bottle design (*page 340, figure 1, right-most two figures show a bottle geometry; it would have been obvious that simulation of blow molding of bottles needed a bottle geometry*);

p. Regarding **claim 4**:

q. Reeve does not specifically teach:

r. determining a bottle wall thickness profile;

s. McEvoy appears to teach:

t. determining a bottle wall thickness profile (*page 339, abstract, "the predicted bottle wall thickness distribution . . ."; and page 351, figure 32*).

u. Regarding **claim 5**:

v. Reeve does not specifically teach:

w. performing a design optimization routine;

x. Official Notice is taken that it was old and well known in the art to perform a design optimization routine for optimizing a design. It would have been obvious to the ordinary artisan at the time of invention to perform a design optimization routine with the art of Reeve, Turner and McEvoy to optimize a design of a preform. The motivation would have been the knowledge of the ordinary artisan that optimizing a design saves money. Please refer to U.S. Patent Number 6,725,112 (*figure 2, element 22*) and U.S. Patent Number 6,973,389 (*figure 1, element 30*) for examples of optimization modules.

y. Regarding **claim 6**:

z. Reeve does not specifically teach:

aa. Incorporating the geometry of an existing preform to determine its fitness for use in a specific application;

bb. McEvoy appears to teach:

cc. Incorporating the geometry of an existing preform to determine its fitness for use in a specific application (*page 340, figure 2 displays an existing preform*);

dd. Regarding **claim 7**:

ee. Reeve does not specifically teach:

ff. determining an emission spectra of said primary and secondary heating sources.

gg. Turner appears to teach:

hh. determining an emission spectra of said primary and secondary heating sources (*page 12, section "Source Spectral Distributions"*).

ii. Regarding **claim 12**:

jj. Reeve as modified by Turner does not specifically teach:

kk. discretizing said preform into a plurality of sections.

ll. McEvoy appears to teach:

mm. discretizing said preform into a plurality of sections (*page 343, figure 12, solid element perform; McEvoy performs a finite element analysis which discretizes the preform*).

nn. Regarding **claim 13**:

oo. Reeve as modified by Turner does not specifically teach:

pp. Determining an axial orientation and hoop orientation.

qq. McEvoy appears to teach:

rr. Determining an axial orientation and hoop orientation (*page 349, right-side column, third paragraph, axial and hoop stretch; further McEvoy performed a finite element analysis which would have required a stress tensor which provides hoop and axial direction stress*).

ss. Regarding **claim 14**:

tt. Reeve as modified by Turner does not specifically teach:

uu. axial orientation and hoop orientation are determined for each of said plurality of sections.

vv. McEvoy appears to teach:

ww. axial orientation and hoop orientation are determined for each of said plurality of sections (*page 343, figure 12, solid element preform, McEvoy performed a finite element analysis which would have used the hoop and axial stresses at each element*).

xx. Regarding **claim 18**:

yy. Reeve does not specifically teach:

zz. providing a stress/strain behavior of said material as a function of said temperatures derived in said perform heating module and simulating stretch blow molding of said heated preform;

aaa. McEvoy appears to teach:

bbb. providing a stress/strain behavior of said material as a function of said temperatures derived in said preform heating module and simulating stretch blow molding of said heated preform (*page 343 - 344, section labeled "Material Model", especially "To accurately model the mechanical properties of PET, . . . temperature dependence and strain history should be taken into account"; it would have been obvious that an elastic model included stress/strain behavior*);

ccc. Regarding **claim 19**:

ddd. Reeve does not specifically teach:

eee. Means for generating a bottle geometry for a bottle design;

fff. McEvoy appears to teach:

ggg. Means for generating a bottle geometry for a bottle design (*page 340, figure 1, right-most two figures show a bottle geometry; it would have been obvious that simulation of blow molding of bottles needed a bottle geometry*);

hhh. Regarding **claim 20**:

iii. Reeve does not specifically teach:

jjj. determining a bottle wall thickness;

kkk. McEvoy appears to teach:

lll. determining a bottle wall thickness (*page 339, abstract, "the predicted bottle wall thickness distribution . . ."; and page 351, figure 32*).

mmm. Regarding **claim 21**:

nnn. McEvoy appears to teach:

ooo. ~~a design optimization module for~~ optimizing a material distribution efficiency of said preform (*page 340, right-side column, first sentence, "Generally, preform design is optimized by trial and*

error; however the development of computer techniques has provided a shift toward a more scientific design approach.", and page 339, Abstract, "predicted wall thickness distribution");

ppp. Official Notice is taken that it was old and well known in the art to have a design optimization module for optimizing a design. It would have been obvious to the ordinary artisan at the time of invention to use a design optimization module for optimizing a design with the art of Reeve, Turner and McEvoy to optimize a material distribution efficiency of a preform. The motivation would have been the knowledge of the ordinary artisan that optimizing a design saves money. Please refer to U.S. Patent Number 6,725,112 (*figure 2, element 22*) and U.S. Patent Number 6,973,389 (*figure 1, element 30*) for examples of optimization modules.

18. **Claims 8 – 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve as modified by Turner as applied to claims 1 and 17 above, further in view of Siegel (Robert Siegel and John R. Howell, "Thermal Radiation Heat Transfer", 2002, Taylor & Francis, pages 35 – 63, 155 – 192, 207 – 248, 267 – 286, 295 – 325, 335 – 357, 371 – 406, 419 – 429).

a. Reeve as modified by Turner teaches a method for simulating the heating of a plastic perform as recited in claims 1 and 17 above.

b. The art of Siegel is directed to thermal radiation heat transfer (*title*).

c. The art of Siegel and the art of Reeve as modified by Turner are analogous art because they both pertain to the art of thermal radiation heat transfer (*Reeve, page 285, Abstract*).

d. The motivation to use the art of Siegel with the art of Reeve as modified by Turner would have been the knowledge of the ordinary artisan that when

surface absorptivity depends upon wavelength, that the calculation methods of chapter 7 would apply (*Siegel, pages 267 – 268, sections 7-1 and 7-2*).

e. Regarding **claim 8**:

f. Reeve appears to teach:

g. ~~Determining an absorption spectra of~~ said preform (*page 288, figure 2, preform*);

h. Reeve does not specifically teach:

i. Determining an absorption spectra ~~of said preform~~;

j. Siegel appears to teach:

k. Determining an absorption spectra of *a surface*(*page 268, section 7-2, first paragraph, second sentence; and page 283, equation 7-19,* $\alpha_{\lambda,1}$ *is an absorption dependent upon wavelength; and pages 425 – 426, section 11-3.3 The Absorption Coefficient*);

l. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Siegel and the art of Reeve as modified by Turner to produce the claimed invention.

m. Regarding **claim 9**:

n. Reeve appears to teach:

o. ~~Discretizing~~ said perform ~~into a plurality of blocks of a respective volume, wherein said radiation absorption spectra is determined for each of said plurality of blocks~~ (*page 288, figure 2, preform*);

p. Reeve does not specifically teach:

q. Discretizing ~~said perform~~ into a plurality of blocks of a respective volume, wherein said radiation absorption spectra is determined for each of said plurality of blocks;

r. Siegel appears to teach:

s. Discretizing *a surface* ~~said perform~~ into a plurality of blocks of a respective volume, wherein said radiation absorption spectra is determined for each of said plurality of blocks (*page 283, equation 7-19, and following paragraph,* $\alpha_{\lambda,1}$ *is an absorption dependent upon wavelength, and* A_k *is a discretized area; and page 376, figure 10-3, volume element, and last sentence on the page*);

19. **Claims 15, 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve (Hayden M. Reeve et al., "Experimental and Numerical Investigation of Polymer Preform Heating", April 2001, Journal of Materials Processing & Manufacturing Science, Volume 9, pages 285 – 301) in view of Turner (Travis L. Turner et al., "Numerical and Experimental Analyses of the Radiant Heat Flux Produced by Quartz Heating Systems", March 1994, NASA Technical Paper 3387, pages 1 - 37), further in view of McEvoy (J.P. McEvoy et al., "Simulation of the Stretch Blow Molding Process of PET Bottles", 1998, Advances in Polymer Technology, volume 17, number 4, pages 339 – 352).

a. The art of Reeve is directed to experimental and numerical investigation of polymer preform heating (*title*).

b. The art of Turner is directed to analyses of radiant heat flux produced by quartz heating systems (*title*).

c. The art of McEvoy is directed to simulation of the blow molding process of PET bottles (*page 339, title*).

d. The art of Turner and the art of Reeve are analogous art because they both pertain to the art of thermal radiation heat transfer. Further, the ordinary artisan would have known that quartz heaters were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

e. The art of McEvoy and the art of Reeve are analogous art because they both pertain to the art of preform heating (*McEvoy, page 340, figures 1 and 2, and left-side column, second paragraph, and right-side column, first paragraph*).

f. The motivation to use the art of Turner with the art of Reeve would have been the benefit recited in Turner that a method is developed for predicting the radiant heat flux distribution produced by quartz envelope heating systems (*page 1, section "Summary", first paragraph*), which would have been recognized as a benefit by the ordinary artisan because the ordinary artisan would have known that quartz heating systems were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

g. The motivation to use the art of McEvoy with the art of Reeve would have been the benefit recited in McEvoy that a simulation was successfully carried out to evaluate the optimum process conditions for a given preform and bottle (*page 351, section labeled "Conclusions", last sentence*), which would have been recognized as a benefit by the ordinary artisan.

h. Regarding **claim 15**:

i. Reeve appears to teach:

j. inputting a preform geometry into a preform design program (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2*);

k. providing oven geometry and calculating spatial location of said preform through at least one oven (*page 289, section labeled "Model", first paragraph, "The numerical domain is comprised of the furnace cavity and the polymer preform", and page 288, figure 2; it would have been obvious to calculate the spatial location of a preform through an oven, for example, see U.S. patent 4,407,651, column 1, lines 15 – 18, and U.S. patent 5,607,706, column 6, lines 8 – 15, both patents disclose a preform moving through an oven*);

l. providing heating information (*page 289, section labeled "Model", third paragraph, "The furnace wall temperature profile and iris temperatures were prescribed . . ."*) ~~and calculating temperatures of primary and secondary heating sources~~;

m. solving energy equations based upon said preform geometry, said spatial location of said preform, said temperatures, cooling air and radiation absorption spectra of a material of said preform (*pages 290 - 291, section labeled "Governing Equations", especially equation 4, the energy equation;and page 289, section labeled "Model"); and*

n. computing at least one cross sectional thermal profile of a final heated preform (*page 293, figure 4, section (c), please note the temperature profile of the preform; and pages 293 - 294, section labeled "Predicted Heat and Flow Patterns"*).

o. Reeve does not specifically teach:

p. A method for the virtual prototyping of plastic containers;

q. generating a bottle geometry for a bottle design;

r. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources;

s. providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform; and

t. determining a bottle wall thickness profile.

u. Turner appears to teach:

v. ~~providing heating information and~~ calculating temperatures of primary and secondary heating sources (*page 11, right-side column, starting at the second paragraph that starts with, "A filament has a radiative power . . ."; and pages 2 - 3, section labeled "Scope of the Present Study"*);

w. McEvoy appears to teach:

x. A method for the virtual prototyping of plastic containers (*page 339, title*);

y. generating a bottle geometry for a bottle design (*page 340, figure 1, right-most two figures show a bottle geometry; it would have been obvious that simulation of blow molding of bottles needed a bottle geometry*);

z. providing a stress/strain behavior of said material and simulating stretch blow molding of said heated preform (*page 343 – 344, section labeled "Material Model", it would have been obvious that an elastic model included stress/strain behavior; and page 339, title*);

aa. determining a bottle wall thickness profile (*page 339, abstract, "the predicted bottle wall thickness distribution . . ."; and page 351, figure 32*).

bb. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

cc. Regarding **claim 16**:

dd. The rejection of claim 15 above teaches most of claim 16 also. The differences are taught below.

ee. Reeve does not specifically teach:

ff. Generating a preform design for said bottle by means of a preform design program;

gg. McEvoy appears to teach:

hh. Generating a preform design for said bottle by means of a preform design program (*pages 342 – 342, section labeled "ABAQUS Model" and figures 11 and 12; it would have been obvious that ABAQUS was used to design a preform. Further, the prior art of the Applicant admits that U.S. Patent 6,116,888 teaches utilizing a CAD software to design a bottle, and it would have been obvious to use the CAD software to design the preform also*);

ii. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

20. **Claim 22** is rejected under 35 U.S.C. 103(a) as being unpatentable over Reeve (Hayden M. Reeve et al., "Experimental and Numerical Investigation of Polymer Preform Heating", April 2001, Journal of Materials Processing & Manufacturing Science, Volume 9, pages 285 – 301) in view of Turner (Travis L. Turner et al., "Numerical and Experimental Analyses of the Radiant Heat Flux Produced by Quartz Heating Systems", March 1994, NASA Technical Paper 3387, pages 1 - 37), further in view of McEvoy (J.P. McEvoy et al., "Simulation of the Stretch Blow Molding Process of PET Bottles", 1998, Advances in Polymer Technology, volume 17, number 4, pages 339 – 352).

a. The art of Reeve is directed to experimental and numerical investigation of polymer preform heating (*title*).

b. The art of Turner is directed to analyses of radiant heat flux produced by quartz heating systems (*title*).

c. The art of McEvoy is directed to simulation of the blow molding process of PET bottles (*page 339, title*).

d. The art of Turner and the art of Reeve are analogous art because they both pertain to the art of thermal radiation heat transfer. Further, the ordinary artisan would have known that quartz heaters were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

e. The art of McEvoy and the art of Reeve are analogous art because they both pertain to the art of preform heating (*McEvoy, page 340, figures 1 and 2, and left-side column, second paragraph, and right-side column, first paragraph*).

f. The motivation to use the art of Turner with the art of Reeve would have been the benefit recited in Turner that a method is developed for predicting the

radiant heat flux distribution produced by quartz envelope heating systems (*page 1, section "Summary", first paragraph*), which would have been recognized as a benefit by the ordinary artisan because the ordinary artisan would have known that quartz heating systems were used in preform heating (*see U.S. Patent 4,407,651, column 1, lines 34 – 36*).

g. The motivation to use the art of McEvoy with the art of Reeve would have been the benefit recited in McEvoy that a simulation was successfully carried out to evaluate the optimum process conditions for a given preform and bottle (*page 351, section labeled "Conclusions", last sentence*), which would have been recognized as a benefit by the ordinary artisan.

h. Regarding **claim 22**:

i. Claim 15 above teaches most of the limitations of claim 22. The differences are taught below.

j. Reeve does not specifically teach:

k. determining a stress/strain behavior of said material as a function of said temperatures derived in said preform heating module;

l. a design optimization module for optimizing a material distribution efficiency of said preform.

m. McEvoy appears to teach:

n. providing a stress/strain behavior of said material as a function of said temperatures derived in said preform heating module (*page 343 – 344, section labeled "Material Model", especially "To accurately model the mechanical properties of PET, . . . <u>temperature dependence</u> and strain history should be taken into account"; it would have been obvious that an elastic model included stress/strain behavior*);

o. ~~a design optimization module for~~ optimizing a material distribution efficiency of said preform (*page 340, right-side column, first*

sentence, "Generally, preform design is optimized by trial and error; however the development of computer techniques has provided a shift toward a more scientific design approach.", and page 339, Abstract, "predicted wall thickness distribution");

p. Official Notice is taken that it was old and well known in the art to have a design optimization module for optimizing a design. It would have been obvious to the ordinary artisan at the time of invention to use a design optimization module for optimizing a design with the art of Reeve, Turner and McEvoy to optimize a material distribution efficiency of a preform. The motivation would have been the knowledge of the ordinary artisan that optimizing a design saves money. Please refer to U.S. Patent Number 6,725,112 (*figure 2, element 22*) and U.S. Patent Number 6,973,389 (*figure 1, element 30*) for examples of optimization modules.

q. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Turner and the art of McEvoy with the art of Reeve to produce the claimed invention.

21. **Examiner's Note:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the Applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. The entire reference is considered to provide disclosure relating to the claimed invention.

Allowable Subject Matter

22. Any indication of allowability is withheld pending resolution of the outstanding rejections.

Conclusion

23. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

24. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

25. The prior art made of record in the previous Office action and not relied upon is considered pertinent to the applicant's disclosure:

a. Robert Siegel and John R. Howell, "Thermal Radiation Heat Transfer", 2002, Taylor & Francis, pages 35 – 63, 155 – 192, 207 – 248, 267 – 286, 295 – 325, 335 – 357, 371 – 406, 419 – 429; teaches knowledge of the ordinary artisan regarding radiation heat transfer (claims 8 – 12), including heat transfer using absorption spectra of materials, and convection.

b. P.G. Llana et al., "Finite strain behavior of poly(ethylene terephthalate) above the glass transition temperature", 1999, Polymer, pages 6729 – 6751; teaches knowledge of the ordinary artisan regarding temperature dependence of stress/strain in PET.

c. M.C. Boyce et al., "Constitutive model for the finite deformation stress-strain behavior of poly(ethylene terephthalate) above the glass transition temperature", 2000, Polymer, pages 2183 – 2201; teaches knowledge of the ordinary artisan regarding temperature dependence of stress/strain in PET.

d. G. Venkateswaran et al., "Effects of Temperature Profiles through Preform Thickness on the Properties of Reheat-Blown PET Containers", 1998, Advances in Polymer Technology, Volume 17, Number 3, pages 237 – 249; teaches knowledge of the ordinary artisan, especially hoop and axial orientations (claims 13 and 14).

e. Ph. Lebaudy et al., "Heating Simulation of Multilayer Preforms", 2001, Journal of Applied Polymer Science, Volume 80, pages 2683 – 2689; teaches knowledge of the ordinary artisan including spectral absorption characteristics of a preform.

f. Kevin Sandieson et al., "Case study of simulation software in the production design phase", 2001, ANTEC 2001 Conference Proceedings, Volume 3, two unnumbered pages; teaches perform design using software.

g. U.S. Patent 4,407,651 teaches quartz heating systems were used in preform heating, and a preform moving through an oven.

h. U.S. patent 5,607,706 teaches a preform moving through an oven.

i. U.S. patent 6,116,888 teaches utilizing a CAD software to design a bottle.

j. U.S. Patent 6,725,112 teaches an optimization module.

k. U.S. Patent 6,973,389 teaches an optimization module.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russ Guill whose telephone number is 571-272-7955. The examiner can normally be reached on Monday – Friday 9:30 AM – 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Any inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group Receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Russ Guill
Examiner
Art Unit 2123

RG

/Paul L Rodriguez/

Supervisory Patent Examiner, Art Unit 2123